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INFORMATION REPORT

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SUBJECT Activities of the NII-160 Vacuum Tube Plant and Picture Tube Laboratory at Fryazino

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SUPPLEMENT TO REPORT NO.

THIS IS UNEVALUATED INFORMATION

PRODUCTION OF THE NII-160 VACUUM TUBE PLANT

25X1 1.

25X1

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2. This plant housed the machinery for the mass production of all receiver type vacuum tubes, and picture tubes, klystrons, and detectors manufactured at NII-160. The plant was transferred to Fryazino from Tashkent during World War II. Practically all of the departments of the plant were operated three shifts per day, six days per week. /See Enclosure A for a detailed layout of the Vacuum Tube Plant, and Para. 3 of this report for the type of equipment, hours of operation, number of employees, and type of product manufactured by various sections of this factory./ The following is a list of vacuum tubes mass produced at this tube plant.

(a) Picture Tube ACR-1

(Identical to and copied from the British tube.) Mass production of this tube started in 1949. Normally the plant

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STATE	X	NAVY	X	NSRB		DISTRIBUTION		
ARMY	X	AIR ev	X		FBI/ST ev	X		

was to tool up and actually produce the tube during the first year production was assigned. The second year was devoted to producing the tube in quantity without regard to rejects, and the third year was the time that the quality should be stressed. The 1951 norm required that 1000 usable ACR-1's be produced. To get this number it was necessary for 15 to 20 tubes to be produced per day, six days per week. The great wastage of the tubes was principally due to bad cathode materials, and to the fact that the screen material deteriorated rapidly due to contamination by gas used in sealing the tubes. 25 tubes per day was the maximum number of ACR-1's that could be produced with the equipment installed in the tube plant in March 1951.

(b) Picture Tube ACR-10

(Identical to and copied from the British tube.) Mass production of this tube started in 1949. 2000 of these tubes were designed for production in 1951. Rejects of these tubes were normally about 30%; however, in July and August of 1951 the rejects were 100%. was told to remedy the bad screens that were causing 100% rejections. the screens were very dull due to the fact that gas, used to seal the tubes, was entering the tube when the bases were being sealed to the neck of the CRT. The gas was entering due to the fact that the composition of the gas changed daily. Therefore it was impossible to adjust the torch to make certain all of the gas was burned at all times. The hydrocarbons injected into the tube in this manner caused a rapid deterioration of the screen material when the tube was heated in the evacuating process. After this incident, production was resumed at the normal rate. very few ACR 10 tubes were produced in 1949 and 1950.

(c) Picture Tube VCR-1

(Identical to and copied from the British tube.) Mass production of this tube started in 1949. 1000 to 1200 good tubes were scheduled for production in 1951. The reject rate of these tubes was approximately the same as that of the ACR-1 tubes. These tubes as well as the ACR-1 and ACR-10 tubes were delivered to an unknown office named "ВОЕННЫЙ ПРЕД". They were picked up by Soviet army officers (golden epaulets) and three or four Russian women not in uniform. /For details of acceptance tests of these tubes see paragraph 3, point 11, following./

(d) Seven-Inch Kinescopes

Mass production of this tube was started in 1949. an average of 600 tubes is being produced weekly during 1952. This estimate is based on the fact that 89 tubes were produced on the 13th of March 1952 and 130 were produced on the 14th of March 1952. these tubes were being made for use in civilian receivers, since the quality was too poor for use in military equipment. many more of those tubes could be produced

without expanding any of the plant's facilities, since there are 12 pump stands available for use three shifts per day; however, the stands are not operated every day. Instead they are operated for two shifts about four days per week as glass envelopes become available.

(e) Twelve-and Sixteen-Inch Kinescopes

A total of 150-200 of these two types of tubes are produced each month. 25X1 25X1 The delivery of glass envelopes determined 25X1 the number of the tubes produced. These tubes, are also made for use in civilian TV sets.

(f) Klystrons 25X1

These tubes are being mass produced; 25X1 25X1 25X1 75 klystrons were being produced in every 24-hour period 25X1 in January 1951. 25X1 25X1 25X1 In February 1952 the klystron department was moved down to the first floor, where there was about four times the amount of floor space. The move was completed as rapidly as possible, and entailed the moving of all the old klystron-producing equipment as well as the installation of additional eqipment. Two pump stands capable of producing a total of 75 klystrons in a 24-hour period were moved, as was glass-to-metal-sealing equipment. An argument arose during the move. The argument was between the pumpmeister in the new klystron department and the pumpmeister in the old department, and came about because the new department pumpmeister wanted eight pumps rather than just the two that were previously used for klystron production. The new klystron department was in mass pro- 25X1 25X1 duction in March 1952. 25X1 50 employees worked in the new department and 20 employees worked in the department when it was upstairs. 25X1 25X1 25X1 25X1 Soviet Dipl Ing Klara Grigor-na Nostrina was a technical expert for cathodes and worked in both the old and new departments. She is also an aspirant for "Candidate".

(g) Receiver Type Vacuum Tubes

Various types of octal base, small size vacuum tubes were produced in area five /see paragraph 3, following, for a detailed description of the equipment and number of personnel in this department/. 25X1 25X1 two or three times 25X1 each week single boxes 70 cm/ 70 cm/ 70 cm full of vacuum tube rejects. These boxes were taken outside and the contents were emptied on a large scrap heap. 25X1 25X1 the reject rate ran as high as 50% in some instances and was generally due to poor cathodes. 25X1 the reject rate was never below 20 to 25%. On one occasion 25X1 picked up a box that fell off the scrap

truck as it passed out of the Institute. This box contained several hundred small sized cathodes.

(h) Detectors

This department was installed in the latter part of 1950, employed approximately 50 workers in March 1952, and produced small detectors. All the ceramic tubes for these detectors were stamped out by three hydraulic presses located in Area 27, second floor (see Enclosure (A)). The tubes were 7-10 mm long, 5-8 mm in diameter, and had a 0.5 mm thick wall. Wires, for use in these detectors, were also cleaned of all grease in Area 27.

25X1
25X1

(1) Super Iconoscopes, Image Orthicons, and Dark Trace Picture Tubes 25X1

These are scheduled for production in 1952; however,

25X1

PLANT LAYOUT, MACHINERY, AND LABOR FORCE OF THE NII 160 VACUUM TUBE PLANT

3. The following is a list of the activities and resources of various departments, laboratories, and rooms located in the vacuum tube production building of NII 160. (These areas can be physically located by referring to Enclosure (A));

Area No 1 This area was the office of the Assistant Chief Engineer Shustin. It contained the normal office equipment and was also used as a conference room for engineers assigned to this Laboratory; Arkin (Soviet), Dr. Mie (German), Krueger (German), and Fischer (German). This laboratory was under the jurisdiction of the chief of the institute, Devyatkov, even though it was physically located in the tube plant.

Area No 2 This area was the office of Soviet Engineer Ratenberg, who was chief of the Radio Tube Development Laboratory. Three secretaries and Mr. Ratenberg worked in this office.

Area No 3 This area was the office of the director of the entire vacuum tube production factory. 25X1 25X1 He came there in the first part of 1951. The old director of the tube plant was a Soviet named Klepikov. 25X1

25X1
25X1
25X1

Area No 4 Five pumping stands were in this room. They were used by the radio tube development laboratory and had nothing to do with the mass production of

25X1

vacuum tubes. The pumps were single, hand-operated machines and were [illegible] of evacuating tubes past 10-6 mm per square cm.

Area No 5a There were 10 test stands located in this [illegible]. These test stands were used to test the receiver tubes that were developed in the laboratory as well as a few rejected tubes that had been mass produced. Five of the test stands were new and capable of accommodating 50 tubes at one time. The other four or five were older machines and couldn't handle as many. The machines were used to test the emission, tube characteristics, and life-time of the various tubes. This laboratory is responsible for spot testing and modifying tubes in mass production, as well as developing new tubes. [redacted] the 25X1 laboratory is not confined to modifying only the tubes mass produced at NII 160, but also modifies 25X1 some made by other Soviet factories. Mr. Richter 25X1 has been sent to Novosibirsk on various occasions to supervise the production of vacuum tubes. [redacted]

Area No 5b The main assembly lines for the mass production of receiver type vacuum tubes were located in this area. There were 15-20 assembly lines, each of which was manned by 10-14 girls. Moving belts were started to be installed in January 1951 and by March 1952 approximately eight such lines were in operation. [redacted]

assembly girls sat on only one side of the bel 25X1
This section was operated three shifts per day, six days per week; however, the third shift was o 25X1
a reduced scale and not all assembly lines were manned during this shift.

Area No 5c Eleven automatic sealex machines were installed in this area. These machines were used for the mass production of receiver type vacuum tubes and were in continual use except when broken down. There were two different types of machines. One type was approximately 1.5 meters in diameter, had 12 different sections of operation, moved in steps in a counter-clockwise direction at 5 to 7 second intervals, used gas to weld the glass base to the neck of the glass envelope, high frequency to seal the tubes, and a magnetic device to secure the contact leads. The other automatic sealex machine was one meter in diameter and identical to the 1.5 meter in diameter machine except it had no magnetic device for securing contact leads. [redacted] some of the machines 25X1
were of German origin, some were Soviet copies of German machines, and perhaps some were American machines.
25X1 [redacted] the Soviet-made machines were manufactured at the OKBM building at NII 160. This belief is based
25X1 on the fact that Mr. Palms [redacted], the German in charge of the OKBM, had made these sealex machines for Telefunken during the war. Furthermore, the OKBM had the machinery and space to make such machines. There was a testing stand located near each pumping machine,

25X1 [redacted] 25X1

[redacted] 25X1
[redacted] the 25X1
tests made on these stands consisted of shorts, emission, continuity, and other normal checks.

[redacted] 25X1
25X1 [redacted] 25X1
25X1 [redacted] 25X1
25X1 [redacted] that 20% to 25% rejects were the absolute minimum. Bad cathodes were the cause of most of these rejects. The German technicians Ganswindt and Buettner worked in this room in the first part of 1952. 25X1

Area No 6a and 6b This area was assigned to Tsekh 34 and was used as offices for the nine Tsekh 34 engineers as well as for the Soviet engineer [redacted] 25X1
25X1 [redacted] in charge of vacuum tube production. The equipment installed in this area consists of normal office equipment.

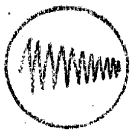
Area No 7 This area served as a store room for grids, cathodes, anodes, and glass bulbs. It was open three shifts per day and had four people working each shift. [redacted]
25X1 [redacted] 25X1

Area No 8 This area was assigned to the picture department. There were two double doors which separated this area from the Tsekh 34 area. The purpose of these doors was not security, but was to keep dust out of the tube mass production area. Area No 8 was used as a repair shop for the repair of picture tube vacuum pumps. There were two lathes and a bo[illegible]ng machine, for fabricating small parts, located [illegible] this room.

Area No 9a and 9b Area 9a is the ante-room to the office of the chief of the picture tube department. There were five people in this office. One of the girls was responsible for seeing that everyone was on time. Area 9b is the office of the chief of the picture tube department, Mr. Machauneeh (phonetic). He was not a technical man, as demonstrated by the fact that he wanted to seal tubes with wax rather than melting the glass together. This incident came up one time when rejects were high due to poor sealing equipment.

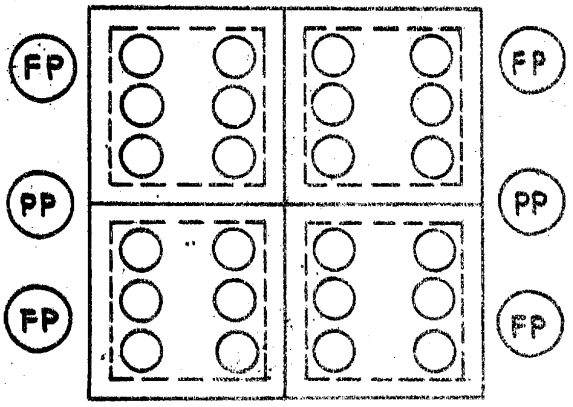
Area No 10 An elevator that never worked. Used for the storage of chairs.

Area No 11 (23 employees worked in this area on the day shift. There were a few less working on the second and third shifts.) This was a room where ACR No 1 and 25X1
VCR No 1 picture tubes were tested. There were two English manufactured test sets for testing these 25X1
tubes. [redacted]
25X1 [redacted] each set was about 9 feet long, 3 feet wide, and 3 feet high. [redacted]
the equipment was delivered to the USSR sometime during World War II. The inscription on the sets was in English. The only test indication known to me was a scope pattern, as shown:



This room also contained desks for the chief of the pump stands (room 12) and desks for 2 OTK inspection men and a military acceptance team for accepting ACR No 1 and VCR No 1 picture tubes. This room was a responsibility of the OTK (Section of Technical Control) and was in no way under the control of either the chief of the picture tube laboratory or the chief of NII 160. /See paragraph entitled "Quality Control", page 16 of this report, for more details./

Area No 12 This area housed the iconoscope test stands for the ACR No 1, VCR No 1, and ACR No 10 picture tubes /see 12 A and B on Enclosure (A)/. There was one stand for testing the ACR No 1 and VCR No 1 tubes and one for testing the ACR No 10 tubes. Both of the test stands were made at NII 160, were very simple in construction, capable of testing only one tube at a time, and used for testing heaters, anodes, and focusing of the picture tubes. Also installed in this area /see 12 C/ were two stands designed to age the cathodes of completed kinescopes, ACR No 1 tubes, VCR No 1 tubes, and ACR No 10 tubes. Each machine was operated by two operators and was capable of handling 10 ACR No 1 or VCR No 1 tubes at one time; however, five of these tubes were usually all that were aged at one time. It took approximately 30 to 40 minutes to age each batch of tubes. The second machine was capable of handling 18 tubes at one time; however, usually 25X1
12 or 18 were normally handled by the two operators. Again 30 to 40 minutes were required for the handling of each batch of tubes. [redacted] sketch /see 12 D and E/ shows the German test stands designed to calibrate 25X1
measuring instruments. These never did work [redacted]
25X1 [redacted] A table at which two girls worked to attach tube bases to the picture tubes is also shown /12 F/. There were two small ovens on each table to help them accomplish their work. There were two pump stands for the ACR No 1 tube and one pump stand for the VCR No 1 tube /See 12 G and H/. Each stand can pump five tubes simultaneously during a 6-to 8-hour period. The pumps, both pre-pump and final pump, were made at NII 160 and were operated by two people at each stand. There were also 12 or 16 pump stands for the pumping of kinescopes /12 I/. There are two preliminary pumps and four final pumps for each group of four pump stands, as indicated below:



Removable ovens capable of maintaining a 410° C temperature during the final evacuation of the CRT's. These ovens were operated at 370° C to keep from damaging the screen materials; however, [redacted] the resulting poor vacuum definitely shortened the life of the tube. 25X1

CRT's being evacuated

Preliminary Pump Stands

Final Pump Stands

There were either 3 or 4 of these machines. Each are as shown in the above diagram.

25X1

These pumps were Soviet copies of the pumps taken to the USSR from the German Farnsch Televit plant. All the pumps in use were made at NII 160 and used oil. The preliminary pumps were capable of evacuating a tube to 10-3 mm of mercury in approximately 4 minutes and were considered to be excellent pumps. The final vacuum pumps were supposed to be able to evacuate down to 10-7 mm of mercury. [redacted] 25X1
25X1 [redacted] it was impossible for them to do so. 25X1
These pumps were always breaking down. It took approximately 4 hours to evacuate each batch of tubes. Each pump had to be removed and cleaned each week. [redacted]
25X1 [redacted] this was due to the poor quality of oil used and the dirty working conditions surrounding the tube assembly area. The Soviets designed a liquid air 25X1
evacuation pump in the fall of 1951. It had not been installed [redacted] but was expected to reduce the evacuation time even though it was designed to evacuate only to 10-7 as do the presently used oil pumps. Four oil type vacuum pumps /see 12 J/ designed for evacuating the ACR No 10 tube appear on my sketch. All technical details of these pumps are identical to the one previously mentioned /see description for 12 I/. There was an American-made automatic sealing machine designed for the sealing of CRT's /see 12 K/. [redacted] 25X1
[redacted] it 25X1
25X1 was anchored in the cement floor of the tube plant [redacted] in 1949. It was 3 meters in diameter, could accommodate 7-inch, 12-inch, and 16-inch iconoscopes, and had 15 different full automatic processes of sealing the tube. It was never put into operating condition by the Soviets. They worked on the machine during July and August 1951 trying to get it in operating condition; however, they did not succeed. It was impossible for them to regulate the heat properly. The tube envelopes would either melt too much or the glass welds would break. The Soviets never tried to operate the machine after August 1951;
25X1 however, [redacted] they will try to get it operating. The working area assigned the glass blowers is shown /see 12 N/. They were responsible for the repairing of all the glass tubes of the picture tube pumping stands. They also sealed the ACR No 1 side connection. Two automatic machines for welding the glass evacuating stems to the glass envelopes of the ACR No 1, VCR No 1, ACR No 10, and kinescope tubes were employed /see 12 L and M/. Each machine could accomodate only one tube at a time and required 5 - 7 minutes per tube. They were old Telefunken machines. One of them was used three shifts per day, exclusively for kinescopes, while the other was used for the remaining type tubes. The latter was also operated three shifts per day, six days per week.

Area No 13 This area served as a supply room for hand tools and administrative supplies. It was manned by one Soviet girl on a one shift per day basis.

Area No 14 A large glass blowing shop which operated three 6-man shifts per day. All glass stems of the CRT's and the

glass faces of the CRT's were welded in this area except for the ones needed for the ACR No 10 tubes. The ACR No 10 tubes were one piece envelopes and were not made at NII 160. To accomplish the making of all the picture tube envelopes were two or three horizontally operating machines. At these benches the side connections were made for the CRT's in addition to the repair of CRT glass envelopes. There was some extra space in this room which is believed to be ear-marked for the production of envelopes for the super iconoscope and dark trace tubes.

Area No 15 — There were three large electric ovens installed in this room. These ovens, which were made at NII 160, were used for the annealing of glass tubes. Glass tubes were also stored in this room, which was manned by 2 men per shift on a three-shift per day basis.

Area No 16 — The CRT envelopes were cleaned with flouric acids, were dried, and then the aquadag material was applied. Four people worked on each of the three shifts per day. The tubes were first washed with distilled water furnished by a small distillation plant /16 B/. Next, the tubes were washed with flouric acid and then once again with distilled water. The aquadag was then applied manually with a brush while the envelope was slowly rotated by a machine. Next, the rotating machine /16 A/ was used to heat the envelope to 350° C and to hold it while warm air was blown into the glass to remove the aquadag gases. The machine was 2 1/2 to 3 meters in diameter and could process 10 to 20 envelopes in a 30-minute period.

Areas No 17 & 18 — These two areas were remodeled in February 1952. Previous to the remodeling the screen materials were applied to the ACR No 1 and VCR No 1 envelopes. This was accomplished by hand and consisted of placing some wax in the tube, heating the wax, and shaking the tube in a circular fashion until an even coating of wax was deposited on the inside surface of the face of the CRT. Next, the luminous material was placed in the tube and shaken. Finally, the girl took a metal arm, which held a small cotton ball, and wiped off the edges of the screen. After February 1952 machinery was installed in this room. I believe that screen material was to be applied to the ACR No 1, ACR No 10, VCR No 1, and to kinescopes. The ACR No 10 screen spraying equipment was transferred from NII 602 /Comment: Actually NII 6327. This equipment consisted of a table designed to hold the envelopes while a nozzle sprayed the screen material on.

Area No 19 — Twenty employees worked on each of the three shifts operated by this section. Assembly of the electron guns for all picture tubes produced at NII 160 was accomplished in this room. There were three assembly lines with small welding machines installed at 25 separate places. Forms were used to correctly align the various grids and anodes that made up the electron gun. Twelve girls worked on the assembly of electron guns for kinescopes on a full time basis, while four girls worked on the assembly of guns for oscillograph tubes on a part time basis. In addition, part of

this area was used for the storage of all the individual parts of the tubes produced at NII 160. These parts were stored in evacuated metal boxes every night. These stocks were replenished every month, with a five-week supply being on hand at the beginning of each month. The exception to this rule was the supply of coated cathodes. These were usually delivered daily; however, approximately 10,000 coated cathodes were delivered in January 1952. These were all sealed in evacuated jars, and stored for later use. [redacted] these had been made up during the cold dry winter period and were to be used in tubes produced during the summer months. This was done due to the fact that the cathodes produced in the summer months were not any good since they were produced in a non-regulated room. The dampness and heat of the summer months caused as much as 90% of the cathodes to be rejected.

Area No 20 [redacted] the luminous screen materials for picture tubes were made here and in the small block house attached to this area. Pipes 20 cm in diameter lead into this building. A strong odor of H^2S was always prevalent. [redacted] all of the luminous material used at NII 160 was precipitated in this area.

Area No 21 [redacted] Areas 21, 22, 23, and 24 belonged to Tsekh 38 and Tsekh 38 was responsible for the production of all grids, cathodes, plates, etc., used at NII [redacted]. Tsekh 38 was always a bottleneck in the final production of tubes. One example of this was the constructing of a cathode machine in January 1951. A German and his son (Rothenburg) constructed a machine capable of forming and cutting 10,000 cathodes within a 24-hour period. There was only one cutting blade for this machine, and no other one could be obtained even though the Germans repeatedly asked for another one. Finally the blade broke and there were no cathodes made at Tsekh 34 for an eight-day period.

Area No 22 Eight girls operated five hydrogen ovens and three metal strip treating machines in this area. The five hydrogen ovens were 1 1/2 meters long and 7 cm in diameter. They were used for the heat treating of metals that were to be made into grids, anodes, etc. The three wire treating machines were used for cleaning wires for use in making vacuum tube grids.

Area No 23 Ten Soviet women worked in this room. They placed individual cathodes in a machine which was capable of dipping 100 cathodes per hour. There were 8 or 10 of these machines. This process was supposed to be secret. [redacted]

Areas No 24 & 25 [redacted] approximately 24 girls worked here on the day shift. [redacted]

25X1

worked by people assigned to these rooms or not. 25X1

Area No 26 This room was attached to Tsekh 33 when the move took place in February 1952. [redacted] it 25X1 was concerned with the research of luminous screen materials prior to the move.

Area No 27 This was the room in which the German, Dr Schloemilch, had his office. Dr Schloemilch was practically exiled to this room in January 1951. There were three hydraulic presses located there as well as a small water distillation plant and a wire cleaning machine. All of this equipment was used for the production of detectors. /See paragraph 2 h above/ 25X1 A total of 9 people worked in this area on the day shift. [redacted]

Area No 28 This area contained 8 cathode spraying machines which were operated by 10 to 12 girls per shift on a three-shift basis. Two of the devices held 20 picture tube cathodes while the coating material was sprayed on manually. Six of the machines were automatic and were used for the spraying of receiver type vacuum tube cathodes. Each of these six machines was capable of spraying and drying 20 cathodes every two minutes. Ten to twelve girls operated these machines.

Area No 29 Cathode pastes were prepared in this room by a number of employees. Barium, aluminum oxides, and strontium were pulverized and treated in this room. Cathode pastes were the end products.

Area No 30 This room contained a large machine for the precipitation of barium and strontium. It was either a former Telefunken machine or a copy of it, as a photograph of this machine is contained in a book written by a German named Wagner. This machine was not in continuous operation. Collodium (a binder for cathode pastes) was also made in this room. Drying closets and viscosity testing scales were part of the equipment used in this process. The German scientists who worked on the second floor of the tube plant were afraid that the material in this room would be the cause of a big fire due to the fact that the collodium wool was stored in a dry state. Five girls and 3 chemists worked in this area.

Area No 31 The office of the chief technical engineer of the tube plant was located in this room. His name was Korolenko (spelled phonetically). All technical drawings and production procedures were made up in this office. A total of 7 engineers (Soviets) and 8 girls worked in this room on a one shift a day basis.

Area No 31a This area housed a small construction office where machines were designed for use in the mass production of vacuum tubes. Five members of the OKBM moved in here when the Germans departed in 1952.

25X1 [redacted]

Area No 32 Dispensary and hygiene rooms.

Area No 33 /Refer to paragraph 2 f above for Source's knowledge concerning the production of klystrons in this area./

Area No 34 Detectors were made in this area. The entire area was occupied by work benches and testing benches. 25X1 [redacted] this room belonged to Tsekh 37. The ceramic sleeves and wires made in Dr Schloemilch's office were delivered to this room. Production probably started late in 1950 because at this time the windows opening onto the hallway were painted. Approximately 50 employees entered this area six mornings every week.

Area No 35 This area contained large metal lathes, metal planing tables, milling machines, boring machines, and die making machines. Approximately 20 people worked on the day shift. Areas 35, 36, and 37 all belonged to the same department [redacted] 25X1

Area No 36 This area contained 3 very large stamping machines, approximately 15 small stamping machines, and eight hand-operated folding machines. The 35 to 40 people that worked in this area during the day shift, and the unknown numbers that worked on the other two shifts, were responsible for stamping out all magnetron cavities used by NII 160. In addition they pressed out aluminum tubes 10 cm long, 2 1/2 to 3 cm in diameter, and 0.3 mm thick as well as brass cups 7 cm in diameter and 5 cm deep.

Area No 37 This area contained many small work shops responsible for receiving, storing, issuing, and cutting various types of metal rods and sheets. They also operated a large tool crib.

Area No 38 This area belonged to Tsekh 38 and housed the equipment that stamped out metal sockets, electrolytically plated CRT anodes, and polished CRT anodes. There were four large vats for plating metals.

Areas No 39 & 40 Contained offices of some department heads and engineers [redacted] 25X1

Area No 41 This area was occupied by a glass pressing shop which employed between 50 to 55 workers. Glass bases for vacuum tubes were made here as was the base lead-in wires that were fitted into these bases. Small glass tubes were cut from longer glass tubes. There were from 15 to 25 automatic stamping machines located in this room. [redacted] this shop may have made 25X1 glass bases for vacuum tubes manufactured at other plants.

Area No 42a Belongs to Tsekh 38 and employed 50 girls and 8 mechanics. It contained American, German, and Russian grid winding, cathode stamping, and wire cutting machines. All of these machines made small parts which were used in the construction of the receiver type vacuum tubes made at 160.

25X1

Area No 42b Small precision lathes and work benches installed in this room were used for the making of parts for small production machines assigned to Tsekh 38.

Area No 43 Approximately 7 mechanics worked in this area operating various cutting machines and similar equipment. The room for chief of Tsekh 38 is located in this area.

PICTURE TUBE DEVELOPMENT AT NII 160

4. During World War II, [redacted] a laboratory sponsored by Telefunken [redacted] was located at 37 Planufer Strasse, Berlin, and was concerned with the development of dark trace picture tubes. The laboratory was moved to Neuenhofen near Neustadt on the Olla River, where it remained until it was dismantled by the Soviets. During this time the dark trace tubes were worked on as well as was research on a CRT capable of showing two different colored blips at the same time. (The difference in velocity of electrons striking a CRT screen determines the amount of penetration of the electrons; therefore, if a cascade screen is made of two materials, that give off different colors when excited, it was thought possible to be able to use this system for identifying friendly and enemy aircraft. This system was never endorsed by the Soviets.)

25X1 25X1

25X1 [redacted]

25X1 5. [redacted] the development of the following type picture tubes worked on at NII 160 [redacted] in the Soviet Union:

25X1

(a) The ACR No 1, VCR No 1, and ACR No 10

Picture tubes were being produced in a NII 160 laboratory at the rate of 30 per month of each type in October 1946. One of these three tubes was given the Russian nomenclature *П0-247*; however, [redacted] The first work done on these tubes by Germans at NII 160 consisted of replacing the poor grade mica supports in the tube with ceramic supports. This substantially reduced the number of rejects. Laboratory production of this tube was discontinued in late 1949, at which time the tubes went into mass production at the NII 160 tube plant.

25X1

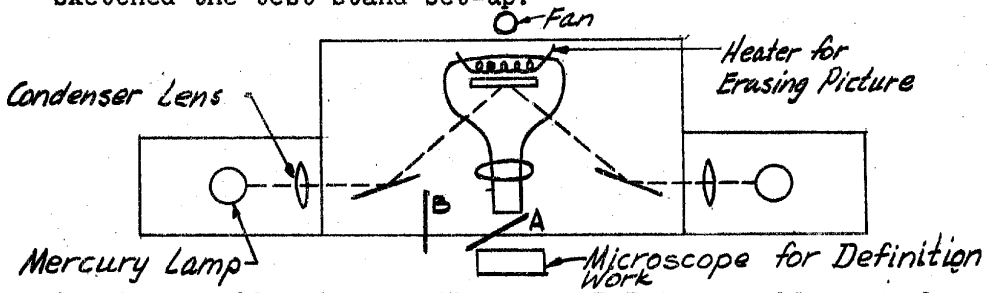
(b) The first six months at NII 160 were spent in remodeling the laboratory, converting the production of electron guns for picture tubes from hand-made to machine-made processes.

(c) Dark Trace Tube

25X1 In the spring of 1947 [redacted] assigned the task of developing screen materials for a dark trace tube to be used for projecting an image 1 meter square. This work consisted mainly of a repetition of [redacted] work in Germany. [redacted] time was spent trying to devise efficient ways of coating the screen of the tube. Much difficulty was experienced in evaporating a smooth layer of cadmium chloride on the plate. Slow progress was made on this problem until November 1948, at which time the Soviet Chief of the Dark Trace Laboratory gave orders to develop and make ready for production a dark trace tube formerly developed at OSW. This tube was given the Russian nomenclature *10ЛКнТ* (the 10 is the diameter of the screen in cm, the Russian L means

25X1 25X1 25X1

ray or beam, K means kinescope, the Russian P designates PPI, the T designates dark trace, and the number 1 signifies that this is the first series of this type tube.)
25X1 the pressure for early production of this tube was a result of the Soviets' having developed and started production of a radar set designed to use this tube. Laboratory models of this tube were operating by January 1949. By the end of 1950 this dark trace tube had been developed to a place where it was more sensitive than those graphed on Page 670, Volume 22 of the MIT series of books
25X1 published in 1948.
25X1 attribute this added sensitivity to the use of more pure screen crystals. Also by the end of 1950 the norm was set at 12 good tubes per month. To obtain this norm it was necessary for 100 tubes to be made monthly. Approximately 50 of these 100 were rejected by the NII 160 Dark Trace Laboratory. The remaining 50 left NII 160 by truck and then approximately two weeks later the Germans in the laboratory were notified how many of that 50 had been acceptable. the dark trace tube is scheduled for mass production in 1952. The dark trace tubes made at NII 160 were tested using a test stand copied from the one described on Pages 666 and 667 of Volume 22, MIT Radiation Laboratory series books. The exception to this equipment was that an after-glow
25X1 tube, manufactured by NII 602
25X1 was used for recording decay time rather than the pen and ink recorder described in Volume 22. sketched the test stand set-up:



A = A removable mirror. When in place the tube picture is projected onto a ground glass plate.

B = A removable ground glass plate. When removed the picture on the CRT screen is projected onto a regular screen.

The long glow tube from NII 602 /NII 6327 worked on 10 KV, had a cascade type screen, and a good after-glow of 20 to 25
25X1 seconds. it was a copy of an American 5FP7. This tube was delivered in the summer of 1950. it was 25X1 serially produced rather than mass produced. 25X1
25X1 the dark trace tubes (10 LKPT1) were to be used as (PPI) plans position indicators for one meter square screen
25X1 projection. a set utilizing 50 KV was to have been perfected in 1951 and that screen projections of 4 x 4 meters would be possible with this new tube. This information is based on hearsay, 25X1
25X1 many design problems 25X1 entailed by this additional voltage. The German engineers tried to dissuade the Soviets against this new tube.

 25X1

(d) Image Orthicons

In the beginning of 1950 the Bildsenderoehren /picture transmitter tube/ laboratory started the development of image orthicons. The chief of this laboratory was a Soviet who returned from having studied the CBS system in the United States. He claimed to be closely associated with Mr Goldmark of CBS and was a very industrious engineer. [redacted] 25X1
25X1 [redacted] the first series of 10 laboratory tubes were produced by the last of 1950. [redacted] these tubes 25X1
25X1 were scheduled for production, [redacted] in March 1952.

(e) 7, 12, and 16-inch Kinescopes

Kinescope development was started in January 1947. By 1949 the 7, 12, and 16-inch kinescopes had reached such a state of development that they were removed from laboratory development status and were transferred to the tube plant for mass production. [redacted] 25X1
these tubes were designed and produced for civilian television sets. [redacted] the tubes were 25X1
of very poor quality and had a low development priority.

(f) Metallic Kinescopes

In the summer of 1950 the German engineer, Mr Werner Kluge, was asked to survey all American electronic publications for the purpose of determining whether or not metallic kinescopes could be made at NII 160. Mr Kluge [redacted] 25X1
scanned all of the literature, and then informed the Soviets that the NII 160 effort should be directed toward making 24-inch glass kinescopes rather than metallic kinescopes. In January 1951 the Soviets ordered the laboratory to start making a small metallic kinescope. [redacted] in 25X1
March 1952 the necessary machinery for the production of small metal cones needed in the production of metallic kinescopes had been completed. The tube being made was a copy of an RCA metallic kinescope which was obtained and analyzed in 1951. [redacted] 25X1
25X1
[redacted]

(g) Rectangular Kinescopes

Rectangular kinescopes were to be developed in 1948; however, it was never possible to get any to work properly, so the project was dropped. It was first impossible for the glass bulbs to be made; consequently, the bulbs were obtained from Osram in East Germany. Finally the entire project was discontinued due to poor picture definition.

(h) Memory Tube

25X1 In January 1950 [redacted] forced to vacate part of the area [redacted] 25X1
25X1 [redacted] for the development of dark trace tubes. This area was assigned to Soviet Engineer Astrin and two other Soviets. One of the other Soviets assigned there was a major who wore gold epaulets with red borders. Later in 1950 two Soviet female technicians, Marczinzcua and Marina Olenikova, were assigned to this secret laboratory. [redacted] 25X1
25X1 [redacted]
25X1 [redacted] About once every two or three days a tube covered with a cloth would be carried out of this room [redacted] and thus 25X1

out of the tube plant. The tubes appeared very similar to the ACR No 1 tubes; however, [redacted] they were two-gun memory tubes. [redacted] The results of this survey were submitted to the Ministry through normal NII 160 channels and were to be included in 1950 production plans. Later on [redacted] the Ministry wasn't interested in any such plans; however, two Soviet engineers arrived in January 1950 and received the results [redacted] study.

(1) Modified ACR No 1

In July 1951, [redacted] German glass blower [redacted] had just received a group of ACR No 1 envelopes that had very thick glass for the side connection (high voltage connection for the aquadag). [redacted] modified ACR No 1 tubes were being made and that 30 KV was being used for the high voltage tension rather than the normal 2 KV. [redacted] they were all laboratory produced and not more than 50 were made each month.

INSTITUTE NO 602 /632/

6. [redacted] there is a Soviet institute located in Moscow that does work which parallels the picture tube development done at NII 160. The main difference between the two institutes is that the Moscow institute is completely Soviet manned and is concerned only with military applications. [redacted] the institute is called NII 602 and is located in Moscow near the vicinity where Leningrad Shosse becomes Gorkiy Street. [redacted] [redacted] German engineer Dirbach worked in this institute for a few weeks in 1947. [redacted] this was NII 632 rather than NII 602/ [redacted] cascade CRT's were made at NII 602 /632/. [redacted] the testing of ACR No 1, VCR No 1, and ACR No 10 tubes at NII 160. [redacted] NII 602 /632/ was interested in the development of aluminum backed screens for CRT's [redacted] all research on this type screen could be done better at NII 602 /632/ than at NII 160. [redacted] the two-gun memory tubes developed at NII 160 were delivered to NII 602 /632/ for testing. [redacted]

QUALITY CONTROL

7. There were six OTK (Section of Technical Control) men assigned to the NII 160 tube production plant in 1951. [redacted] these men were under the jurisdiction of the OTK office in Moscow; however, [redacted] they were not under the jurisdiction of either the chief of the Tube Production Plant or the chief of the Institute. After picture tubes were made they were inspected by employees of NII 160, after which they were inspected by the OTK men. Then in the case of ACR No 1, VCR No 1, and ACR No 10 tubes a military inspection team consisting of a Soviet officer in uniform, two Soviet engineers, and two or three Soviet women would

inspect the tubes in the presence of the OTK men. All rejected tubes were returned to the OTK men, who then returned them to the factory inspectors.

TECHNICAL LITERATURE

25X1 8. [redacted] the publishing of the Radiation Laboratory series of books on radar enabled the Soviets to span twelve years of progress in the electronic field in a period of three years. 25X1 [redacted] had tried for two years to design an efficient means for testing the resolution, sensitivity, and after-glow time of dark trace tubes. [redacted] unable to get satisfactory 25X1
25X1 results until [redacted] Volume 22 of this series and copied the test equipment described in Chapter 18. [redacted] sur- 25X1 prised to find that the tests listed in Volume 22 actually worked out in practice as they were outlined in the book.

9. The MIT series in English was available to Soviet engineers in the spring of 1949 and was used by the Germans as well as the Soviet engineers. Soviet translations of the MIT books were available for purchase in the first part of 1950. These were generally literal translations and contained numerous errors. There were instances where two Soviet books contained the information that was in one MIT book. An example of this is the information contained in Volume 22 of the Radiation Laboratory series. This volume is divided into two parts and a Soviet book is published containing each of these parts. Each of the Russian volumes costs approximately 12 rubles. All American technical publications were available for issue by the Institute library within two months of the date of publication. Any foreign publication desired by NII 160 engineers could be obtained through the Moscow Lenin Library in the event the book was not in the NII 160 library.

DEVELOPMENT LABORATORY BUILDING

25X1 10. [redacted] a sketch of the third floor of this building on which the following is shown /See Enclosure (B)/:

Area No 1 Cathode Ray Tube Screen Preparation Room

A. A work table used for people to put screens on CRT glass envelopes.
B. A drying oven for drying the screen meterials.

Area No 2 Screen Settling Room

A. A table used to place trays for the precipitation of the screen materials.

Area No 3 Washing Room for Cathode Ray Tube Envelopes

A. Washing machine for washing CRT envelopes.
B. Exhaust ventilator.
C. Work bench.
D. Heat generating equipment.
E. Drying machine.
F. Storage cabinets.

Area No 4 Office of Department Chief (Nachalnik)

Area No 5 Outer Office of the Department Chief

Area No 6 Secret Area Where Memory Tubes were Developed

Area No 7 Dark Trace Tube Laboratory

25X1 **Area No 8** Dark Trace Laboratory

A. Work bench for the assembly of iconoscopes.
B. Engineers' desks.
C. Wooden partition.
D. Dark trace tube test stands.
E. 30 KV power supply.
F. Iconoscope testing machine delivered from NII 380.
G. Tempering ovens for treating glass envelopes.
H. Tempering ovens for treating glass envelopes.

Area No 9 Electron Gun Assembly Room

A. Spot welding machines.
B. Electron gun assembly work benches.

Area No 10 Assembly Room for Iconoscopes

Area No 11 Dark Room Where Photo Cathodes and Oxide Cathodes were Tested

Area No 12 Glass Envelope Sealing Machines

A. Sealing machines for iconoscopes.
B. Sealing machine for dark trace tubes.
C. Sealing machine for iconoscopes.

Area No 13 Dark Room for Testing Iconoscopes

A. Iconoscope test stand.

Area No 14 Glass Blowing Shop

A. Horizontal glass welding machine. Used to weld CRT necks to the face of the CRT.

Area No 15 Glass Blowing Shop

A & B. Work tables where glass blowers repaired CRT envelopes that were not properly made by the machine in Area No 14.

Area No 16 Kinescope and Dark Trace Tube Pump Room

A & B. Kinescope pump stands (8 stands).
C. Pump stands for dark trace tubes and secret tubes.
D. Heating oven for annealing CRT glass envelopes.
E. Evaporation stand for coating CRT screens made in the laboratory.
F & G. Laboratory pump stands for iconoscopes, super-iconoscopes, and image orthicons.
H & I. Newly developed test pump stands for decreasing pumping time.
J. Glass treating machine.

Area No 17 Transmitter Picture Tube Laboratory of Talanov

A. Work tables for 2 Soviet technicians.
B. Office of Talanov.

C. Glass blowing equipment.
D. Pump stands for evacuating transmitter picture tube envelopes.

Area No 18 Transmitter Picture Tube Laboratories

The equipment in this room was moved to the 4th floor. /See Enclosure (C)./

Area No 19 Iconoscope Laboratory

A. Testing stand for image orthicons.
B. Electron guns assembly tables (image orthicon guns).
C. Photo Cathode work table.
D. Engineers' tables.

Area No 20 Laboratory (unknown)

Area No 21 Four Offices

(Soviet Engineers Talanov and Vogelsohn had their offices in this area.)

Area No 22 Secret Laboratory

25X1 [redacted] in January 1951 it was being re-constructed.)

Areas No 23 & 24 Secret Laboratories

(No details known)

25X1 11. [redacted] sketches of the fourth floor of this building
25X1 on which the following is shown /See Enclosure (C)/:

Sketch 1 ([redacted] there was a kinescope test stand and an engineers' lecture room in this area.)

Sketch 2 Laboratory for Picture Tube Screen Materials

Item 1 - Exhaust flues for carrying away gases.
Item 2 - Work areas for the mixing of various chemicals used in preparing the screens.
Item 3 - Chemical scales.
Item 4 - Heating room for heating various chemicals.
Item 5 - Dark room containing equipment for the spectral analysis of various materials.
Item 6 - Engineers' desks.

ENCLOSURE: (A) NII 160 - Vacuum Tube Plant (as of March 1952)

ENCLOSURE: (B) Development Laboratory Building, Institute 160, Third Floor Plan (as of January 1951)

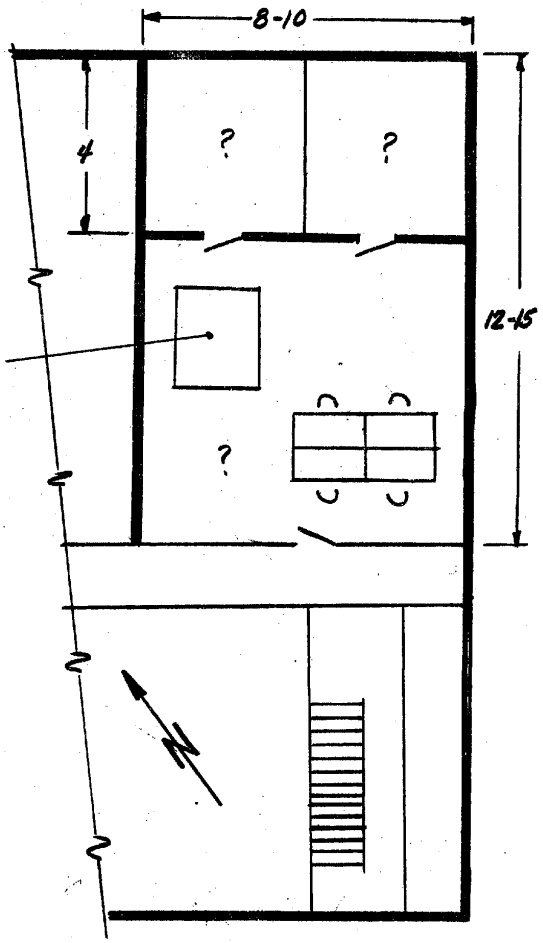
ENCLOSURE: (C) Development Laboratory Building, Institute 160,
25X1 Fourth Floor Plan

[redacted] Comment: The name Marezinaeva may be a garbled version of Marchinskaya.

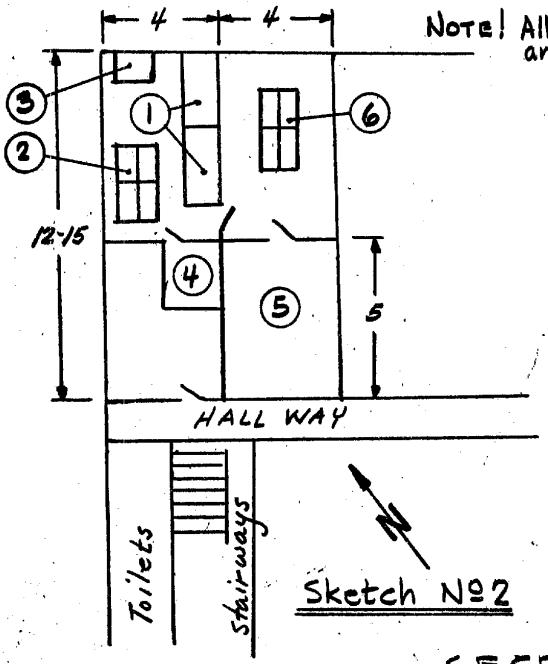
SECRET- SECURITY INFORMATION

25X1

DEVELOPMENT LABORATORY BLDG.
INSTITUTE 160
FOURTH FLOOR



Sketch No 1



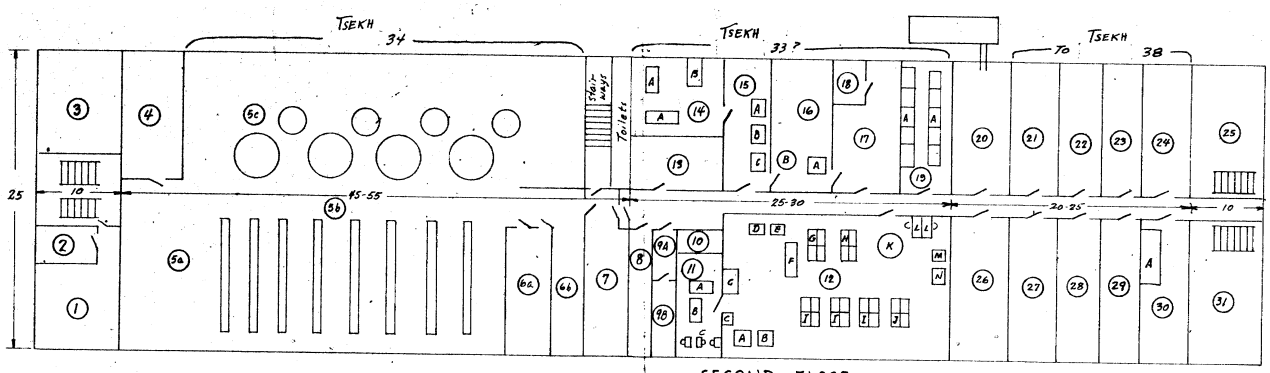
NOTE! All dims are in meters, and are approx.

Sketch No 2

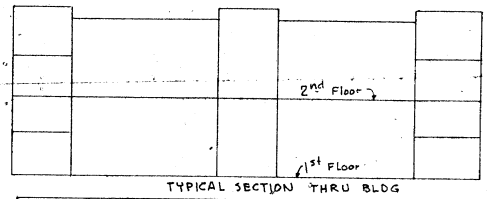
Enclosure (C)

SECRET

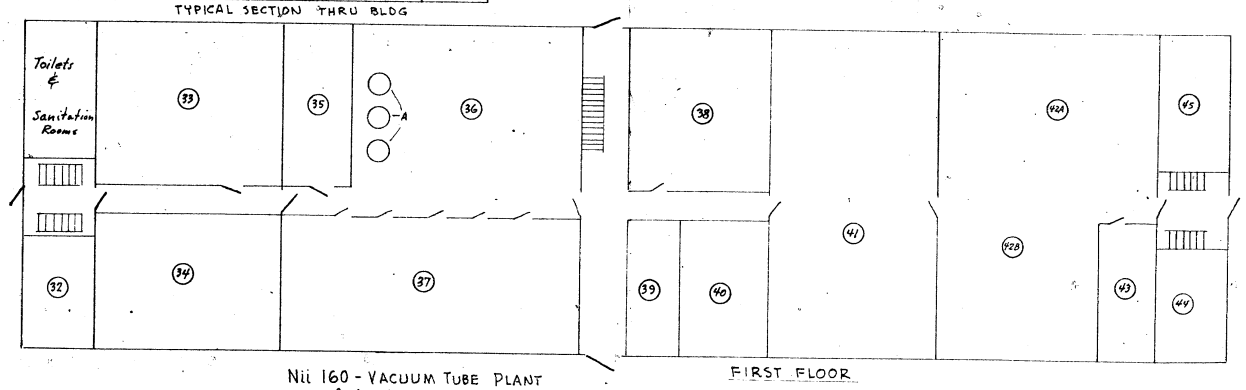
SECRET - SECURITY INFORMATION



SECOND FLOOR



TYPICAL SECTION THRU BLDG



FIRST FLOOR

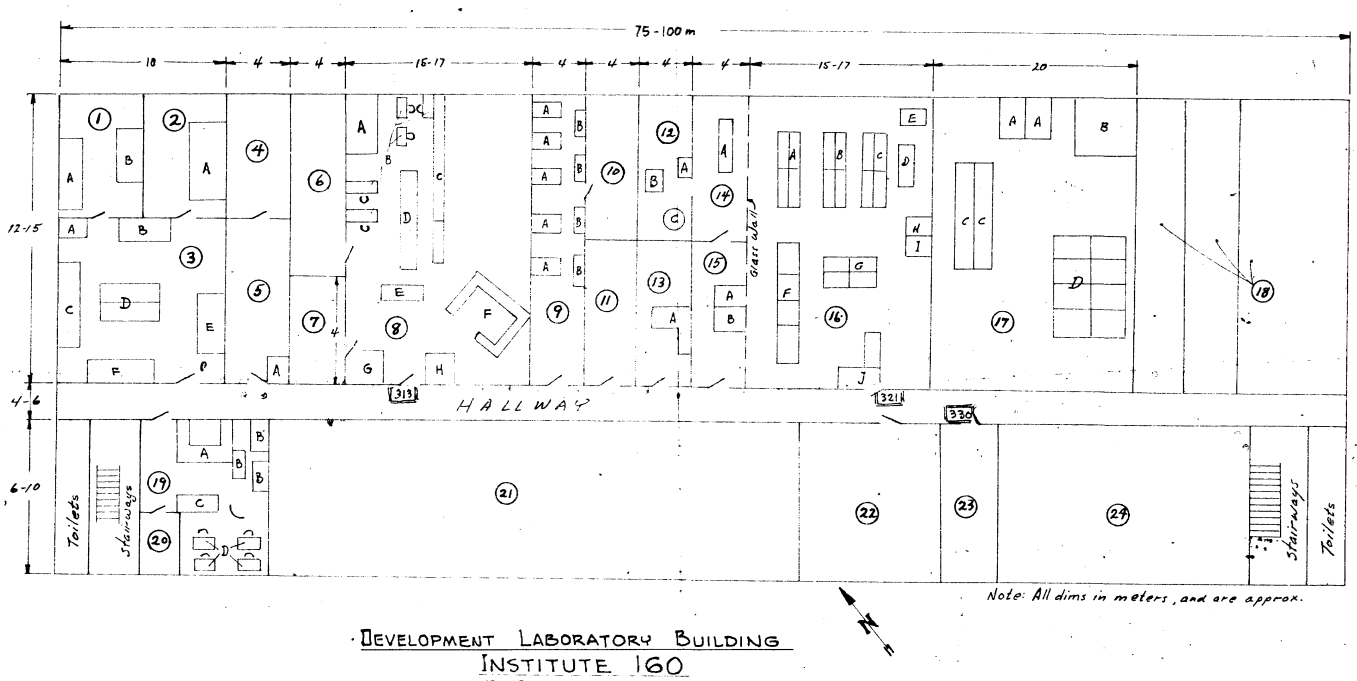
Nii 160 - VACUUM TUBE PLANT
as of March 1952

SECRET

Enclosure (A)

Report No

25X1



DEVELOPMENT LABORATORY BUILDING
INSTITUTE 160
THIRD FLOOR - PLAN
as of January 1951

ENCLOSURE (B)
Report No

25X1